8. NWIS Support Files

8.1 Introduction

NWIS maintains numerous support files, also called reference lists. These reference lists contain data used by NWIS software to verify correctness of data entered into the database and to display lists for the related component variable from which valid entries may be selected. Many of the reference lists are maintained at the national level to ensure consistent data validation throughout the WRD. Whenever there is an update to any of the GWSI support files, with the exception of updates to the geologic unit codes, agency codes and fipsfile codes, the edit tables are rebuilt using “Option 15 : Rebuild Edit Tables” from the GWSI system menu.

There are different types of reference lists maintained by NWIS: (1) Ingres reference lists are usually multi-disciplined lists stored in the Ingres data base. (2) GWSI reference lists generally contain data related to the GWSI, although some contain data that are accessed by other disciplines in the SITEFILE; these data are not stored in Ingres. *[Other discipline reference list types can be described here]*

It is intended that most of these reference lists be modifiable to provide for customized verification to support district requirements. Deleting **data** from some of these files removes the data from being an acceptable data entry. Deleting some of these **files** removes data verification for that variable; this is NOT recommended except for certain files described later in this section. Data may be added, but only under certain circumstances; there is generally a prescribed request and approval process. Individual reference list modifications and limitations will be described in detail later in this section.

The following files, which contain national data, comprise the NWIS-supported set of values for three of the GWSI reference lists. They were distributed with the initial release of software and include:

/usr/opt/nwis/support/aageol.all.states
/usr/opt/nwis/support/aahuc.all.states
/usr/opt/nwis/support/aanwdx.all.agency
[others??]

These files contain all geologic units, hydrologic unit codes, and agency codes for the entire WRD. Subsets of these files comprise valid code lists for districts; preparation, installation and use of these reference lists will be described in detail later in this section. One other important file, **/usr/opt/nwis/support/fipsfile.master**, contains state and county codes, maximum and minimum latitude, longitude, and altitudes. All of these nationally maintained files are redistributed whenever significant updates have been applied; none of these files should be modified at the district level.

8.2 Ingres Support Files

8.2.1 algfile

8.2.2 aqfile

The aqfile contains all applicable geologic/aquifer codes for a districts mission. It is a subset of the master *aageol.all.states* file. It may contain only aquifer codes for a single state or it may contain aquifer codes for multiple states if required by projects such as NAWQA.

8.2.2.1 Request Procedure for Updating Aquifer Codes

If new aquifer codes or modifications to existing codes are needed, a request should be sent to the Chief of NWIS and to the Office of Ground Water (OGW). The request should contain the proposed code, the geologic description or formation name, the State(s) where the unit resides, and any available supporting documentation. The aquifer code is derived according to instructions contained in the appendix. Once the new code and aquifer have been approved by the OGW, the Chief of NWIS will authorize an update to the national list of aquifer codes, aageol.all.states, and you may update your aqfile as described in this section.

8.2.2.2 Procedure for Updating aqfile in Ingres

Enter the new aquifer codes by creating an input file containing the CURRENT contents of aqfile and adding, modifying, or deleting codes to or from the current aquifer code list. **The following procedure requires access as 'nwis' user for update to Ingres:l**

(1) Login as nwis

(2) cd /usr/opt/nwis/support

(3) Obtain a current copy of aageol.all.states from headquarters:

  (a) mv aageol.all.states to aageol.all.states.old for a backup

  (b) ftp /var/ftp/pub/aageol.all.states from nwiqqvarsa

(4) Prepare a file, aqfile.new.temp, that contains updates that you wish to apply to aqfile in Ingres

  (a) Combine desired new codes from /usr/opt/nwis/support/aageol.all.states into file aqfile.new.temp

    1. Use text editor to add single aq codes to aqfile.new.temp.
    2. If you are adding an entire state or states (**xx** = state code), they may be loaded into aqfile.new.temp by:
      a. grep '^**xx**' aageol.all.states > aqfile.new.temp (initial entry)
      b. grep '^**xx**' aageol.all.states >> aqfile.new.temp (additional

states)

(b) *type:* cut -c3- aqfile.new.temp > aqfile.new

(5) mv aqfile.flat_file aqfile.flat_file.org (for backup)

(6) tsql *dbname* “select mds_data from aqfile” > aqfile.old

(7) rebuild aqfile.flat_file:

(a) 1. *type:* cat aqfile.new aqfile.old > aqfile.flat_temp
(If you wish to remove aquifer codes from list of acceptable codes, do so now from aqfile.flat_temp file)

(b) *type:* sort -u +0.0 -0.8 aqfile.flat_temp > aqfile.flat_file

(c) cp aqfile.flat_file $NWISHOME/data/ascii/aqfile.flat_file

(8) drop_table $NWISHOME/support/aqfile

(9) create_table $NWISHOME/support/aqfile

(10) load_table $NWISHOME/support/templates/aqfile.ctrl

(11) modify_table $NWISHOME/support/aqfile

8.2.3 fipsfile

The fipsfile contains descriptive geographical and political information about all US States, Canada, Mexico and some US territories and possessions. It contains State and county FIPS codes, minimum and maximum State altitude, and minimum and maximum latitudes and longitudes for States and counties.

This file is maintained and distributed from headquarters; **under no circumstances** should the master file be modified at the district and loaded into the Ingres data base without approval from the Chief of NWIS. **The following procedure requires access as ‘nwis’ user for update to Ingres:**

8.2.3.1 Request Procedure for Updating fipsfile:

Address all requests for updates to the fipsfile to the Chief of NWIS. The request will be researched to ensure validity of the update. Once this has been done, the Chief of NWIS will approve updates to the national fipsfile, and you will be provided with a new copy of fipsfile.master.

8.2.3.2 Procedure for Updating fipsfile in Ingres:

(1) login as nwis

(2) cd /usr/opt/nwis/support

(3) obtain a current copy of fipsfile.master from headquarters:

(a) mv fipsfile.master to fipsfile.master.old for a backup

(b) ftp /var/ftp/pub/fipsfile.master from nwiqqvarsa

(4) drop_table$NWISHOME/support/fipsfile

(5) create_table $NWISHOME/support/fipsfile

(6) load_table$NWISHOME/support/templates/fipsfile.ctrl

(7) modify_table$NWISHOME/support/fipsfile

8.3 GWSI Support Files

There are three types of GWSI support files: *variable*.edi, *variable*.rng, and *variable*.ovr, where *variable* is the variable name of the component.

Any of these files may be modified, with some restrictions, to allow for customized district validation requirements. Codes contained in the ".edi" files may be **deleted** to eliminate that code as a valid entry. The default ranges in the ".rng" files may be modified to restrict numerical entries to a desired range of values. The ".ovr" may be modified to restrict entry of data to a specific format using the characters described later in this section; this file may be deleted if no specific format is desired.

Additions to the ".edi" file require headquarters approval in order to maintain uniformity throughout the WRD. Procedures for requesting approval are discussed individually later in this section.

8.3.1 Sitefile support files

8.3.1.1 sagncy.edi

The file **/usr/opt/nwis/support/edit.tables/sagncy.edi** contains all valid national and state agency codes for the district. It is a subset of the master list of agency codes contained in the file /usr/opt/nwis/support/aanwdx.all.agency. Additional agencies may be desired if data are entered for other states.

8.3.1.1.1 Request procedure for updating aanwdx.all.agency:

If new agency codes are needed, a request should be sent to the Chief of NWIS and to the Office of National Water Data Exchange (NAWDEX). The request should contain the proposed new agency. NAWDEX will assign a new code if it does not already exist. Once approval for the new code has been received from NAWDEX, the Chief of NWIS will authorize an update to the national list of agency codes, aanwdx.all.agency, a new file will be distributed nationally. You may update sagncy.edi as described in this section.

8.3.1.1.2 Procedure for updating sagncy.edi

(1) cd /usr/opt/nwis/support

(2) Obtain a current copy of aanwdx.all.agency from headquarters:

(a) mv aanwdx.all.agency to aanwdx.all.agency.old for a backup

(b) ftp /var/ftp/pub/aanwdx.all.agency from nwiqqvarsa

(3) Select desired coeds from /usr/opt/nwis/support/aanwdx.all.agency and load them into /usr/opt/nwis/support/edit.table/sagncy.edi file. This file may be prepared by:

(a) grep '^US' aanwdx.all.agency > temp.agncy national agency codes

(b) grep '^**xx**' aanwdx.all.agency >> temp.agncy **xx** = state code desired (repeat for all states agency codes desired)

(c) There may be additional agencies; for example, DMIO-Dames & Moore, Inc., that do not have US or xx. These agencies will not be selected by grep; they need to be identified individually and added to temp.agncy.

(d) sort temp.agncy > sagncy.edi

(e) mv sagncy.edi ../edit.tables

NOTE: If the district uses SWUDS, place the agency codes most frequently used by the local water-use program at the beginning of the sagncy.edi file. This will greatly improve performance in some SWUDS programs.

(4) Run option 15 : Rebuild Edit Tables from the GWSI System Menu **(requires dba access)**

(a) enter default district and county codes. "999" and "99" entered here will result in NO default codes appearing in data entry utilities.

8.3.1.2 shuc.edi

The file **/usr/opt/nwis/support/edit.tables/shuc.edi** contains all valid Hydrologic Unit Codes (HUC) for the district. It is a subset of the master list of HUCs contained in the file /usr/opt/nwis/support/aahuc.all.states. Additional HUCs may be desired if data are entered for other states.

8.3.1.2.1 Request procedure for updating aahuc.all.states:

None established.

8.3.1.2.2 Procedure for updating shuc.edi:

(1) cd to /usr/opt/nwis/support

(2) Select desired codes from /usr/opt/nwis/support/aahuc.all.states and store them into /usr/opt/nwis/support/edit.tables/shuc.edi file. This file can be prepared by:

(a) 1. grep 'bbbb**nn**' aahuc.all.states > temp.huc,
'b' is blank, **nn** is the State number found in columns 17-18 in aahuc.all.states)

(b) grep 'bbbb**nn**' aahuc.all.states >> temp.huc(for additional states)

(c) sort +0.16 -0.18 temp.huc > shuc.edi

(d) mv sagncy.edi ../edit.tables

(3) Run option 15 : Rebuild Edit Tables from the GWSI System Menu **(requires dba access)**

a. enter default district and county codes. “999” and “99” entered here will result in NO default codes appearing in data entry utilities.

8.3.2 Other GWSI support files

The three types of GWSI reference files are described below. Each contains data in a different format, depending on the type of reference list. The name of the reference list consists of the variable name for the related component (***variable***) and the reference list type, separated by a dot:

variable*.edi** - contains lists of valid codes for the related components. The .edi file contains one line for each valid code. The first ***n characters comprise the code, where ***n*** is the length of the variable field. The code is followed by a description; the first 16 characters are displayed when help is requested in one of the input programs.

variable*.rng** - contains valid ranges for selected numeric components. The .rng file contains two lines, the maximum and minimum value for the component. The first ***n characters in both lines comprise the range of valid entries, where ***n*** is the length of the variable field. These values can be followed by a brief description.

***variable*.ovr** - contains valid format for components. The .ovr file contains one line, consisting of the input format definition, limited in length to the field length of the variable, and a brief description.

+	blank, + or - sign, or numeric value
*	blank, or any uppercase character
~	blank, or any lowercase character
?	blank, or any character
-	blank, - sign, or numeric value
#	numeric value
@	blank or alpha character, upper- or lowercase
any other character	-
	only specified character allowed

8.3.2.1 Request procedure for updating other GWSI support files

Address all requests for updates to GWSI support files to the Chief of NWIS. The request will be researched to ensure validity of the update. Once this has been done, the Chief of NWIS will approve updates to the support file, and you will be provided with a new copy.

8.3.2.2 Procedure for updating support files

(1) cd /usr/opt/nwis/support/edit.tables

(2) prepare desired support file(s):

(a) ftp “new support file” from /var/ftp/pub on nwiqqvarsa, if replacing old support file with new one containing headquarters approved updates.

(b) modify desired support files by deleting unwanted codes (.edi), changing range of numerical values (.rng), and/or changing format of data entry (.ovr).

(c) delete .ovr support files for which data verification is NOT desired.

(3) Run option 15 : Rebuild Edit Tables from the GWSI System Menu **(requires dba access)**

(a) enter default district and county codes. “999” and “99” entered here will result in NO default codes appearing in data entry utilities.

Currently, most GWSI components have associated reference lists. If there is a need to prepare and load a reference list where one does not currently exist, follow the following steps below. Creation of a reference list that is not nationally maintained does not require approval. Most of the steps will require **dba** access.

(1) Determine the variable name and field length of the component requiring the new reference list from the data dictionary list utility (option 21 on the GWSI System Menu).

(2) Using a text editor, create the new reference list in the appropriate format explained at the beginning of this section using the variable name as the ***variable*** part of the file name, and the field length to delimit the size of the entered code, range, or template.

(a) mv this file to /usr/opt/nwis/support/edit.tables/.

(3) Run option 2 : Data Dictionary Update. Add the reference list file name to field 20 (Edit Table Name); just add the ***variable***, do not include the suffix.

(4) Run option 15 : Rebuild Edit Tables from the GWSI System Menu

(a) enter default district and county codes. “999” and “99” entered here will result in NO default codes appearing in data entry utilities.

8.4 Description of Code Derivation Procedure

The following coding instructions have been adapted for WATSTORE Users Guide Appendix, chapter F, pages F-6 to F-10, from the original instructions that appeared in the October 1967 AAPG Bulletin; these instructions continue to define the WRD procedure for deriving geologic unit and aquifer codes. These adaptations allow for the use of numeric characters in the mnemonic portion of the code, and provide a code for rock units of unknown age.

The codes are eight characters long and consist of three parts. The first part contains three numeric characters that identifies the Era, System, and Series of the rock unit (Table 1). The numbers 1, 4, and 7 have been preempted in column three for use with the formal series terms Upper, Middle, and Lower, respectively. If a rock unit extends across more than one time unit, the youngest age is coded in the numeric data field.

The second part consists of characters 4 through 7 in the code; they are an alphanumeric mnemonic for the name of the rock-stratigraphic unit. The mnemonic code is developed by eliminating letters from the original term until only 4 remain. The order of letter elimination is listed in Table 2.

The third part of the code, character 8, is a single character and denotes a qualifying term such as Upper, Middle, or Lower. This character is not always used.

8.4.1 Code Derivation Rules:

(1) Prior to eliminating letters, the following should be dropped from the rock-stratigraphic name:

A. The rank of the unit; such as: group, formation, member.

B. Any lithologic descriptors; such as: sandstone, shale, limestone.

C. Insignificant words; such as: the, on, a, an.

D. Qualifying terms (discussed later).

(2) Replace all non-alpha characters with blanks except in the case of aquifers or other rock units named by their depth of occurrence at some geographic locality; such as the “500-foot” sand of the Memphis area. In this case, the first two digits of the four-digit mnemonic field are to be used for the numeric identifier and the geographic locality is reduced to two alpha characters for the last two digits. For example:

```
500-foot sand of the Memphis area          05MP
2000-foot sand of the Baton Rouge area     20BR
```

(3) The first letter of each of the remaining words is not to be deleted. The only exception to this rule of “first letter remains” is in the case of qualifying terms which are coded in column 8. If the word to be coded in column 8 is Upper, Middle, or Lower, use the letters U, M, or L for the respective code. If any other word is to be coded in column 8 and the first letter is U, M, or L, use the last letter of the word which would remain after following the elimination order in Table 2, other than U, M, or L.

(4) Deletion of letters proceeds from right to left in the order given in Table 2.

(5) Deletion is continued until the mnemonic is reduced to 4 characters.

(6) Only one letter of a double letter occurrence is deleted. Exceptions to this rule are:

A. Vowels and the letters W, H, and Y are eliminated completely even though they may occur as double letters before the elimination of any other double letter combination, unless they are the first letter of the word or so doing reduces the mnemonic to less than 4 characters.

B. After elimination of double letters, further letter removal is based on Table 2 without regard to whether or not the letter removed was previously part of a double letter sequence.

C. In the rare instances where the mnemonic reduces to a first letter and two sets of

double letters (as FTTRR), eliminate the first letter on the right without regard for the letter sequence shown in Table 2.

(7) If the original word is smaller than 4 characters, it is entered in the data field left justified. Do not add any characters to fill up the data field, leave unused spaces blank.

(8) If duplicate codes appear, some alteration of the code will be made by the Ground Water Branch. This must be done to insure system-wide uniqueness. The rule to be followed with formal names will be to retain the correct mnemonic code with the name which has priority in time. The second name will be coded retaining the first vowel. If mor than two names reduce to the same mnemonic, it may be necessary to make some arbitrary code adjustment for the third and any subsequent names. These same rules will be used, where possible, with informal names.

(9) Column 8 may be used for modifiers of the rock-stratigraphic unit. The code may be any computer character with the exception of those preempted for specific modifiers; such as: U, M, and L for Upper, Middle, and Lower.

(10) Rock names such as McGregor, St. Lawrence, and Van Allen are to be considered as two words.

Table 1. Numeric Codes for Geologic Age Identification

	Code
Unknown Age	000
Cenozoic	100
Quaternary	110
Holocene	111
Pleistocene	112
Tertiary	120
Pliocene	121
Miocene	122
Oligocene	123
Eocene	124
Paleocene	125
Mesozoic	200
Cretaceous	210
Upper	211
Gulfian	212
Lower	217
Commanchean	218
Coahuilan	219
Jurassic	220
Upper	221
Middle	224
Lower	227
Triassic	230
Upper	231
Middle	234
Lower	237
Paleozoic	300
Permian	310
Upper	311
Ochoan	312
Guadalupian	313
Lower	317
Leonardian	318
Wolfcampian	319
Pennsylvanian	320
Upper	321
Virgilian	322
Missourian	323
Middle	324
Des Moinesian	325
Atokan	326
Lower	327
Morrowan	328
Mississippian	330
Upper	331
Chesterian	332
Meramecian	333
Lower	337
Osagean	338
Kinderhookian	339
Devonian	340
Upper	341
Middle	344
Lower	347
Silurian	350
Upper	351
Cayugan	352
Middle	354
Niagaran	355
Lower	357
Alexandrian	358
Ordivician	360
Upper	361
Cincinnatian	362
Middle	364
Champlainian	365
Lower	367
Canadian	368
Cambrian	370
Upper	371
St. Croixan	372
Middle	374
Lower	377
Precambrian	400
Precambrian Z	410
Precambrian Y	420
Precambrian X	430
Precambrian W	440

Table 2. Order of Letter Elimination

1. **A**	10. **T**	19. **G**
2. **E**	11. **N**	20. **P**
3. **I**	12. **S**	21. **K**
4. **O**	13. **R**	22. **B**
5. **U**	14. **L**	23. **V**
6. **W**	15. **D**	24. **X**
7. **H**	16. **C**	25. **J**
8. **Y**	17. **M**	26. **Q**
9. **Double Letters**	18. **F**	27. **Z**